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ABSTRACT

This report addresses the issue of whether Ontario's investment in elementary education is adequate. Specific questions are posed, reviews of relevant literature conducted, and an assessment of the soundness and completeness of existing evidence is made. After an introductory overview, chapter 2 presents a series of five tables illustrating Ontario school finance trends from 1968 to 1980: per pupil expenditures; the allocation of these funds among public, separate, and secondary schools; the number of special education students; the number of pupils per teacher; and the ratio of public and separate school pupil-teacher ratios to secondary school pupil-teacher ratios. Chapter 3 reviews research that demonstrates the social benefits of education to the entire community. Chapter 4 reviews research showing a positive correlation between education and public health. Similarly, chapter 5 reviews research showing an inverse correlation between education and the crime rate, while chapter 6 draws on research to show the positive effects of education on economic growth. The concluding chapter discusses the private and social rates of return on investment in education. An epilogue provides an update on recent actions taken by the Ontario government in support of education and points out the need for further research. (TE)

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IS ONTARIO UNDER-INVESTING IN ELEMENTARY EDUCATION?

A Research Agenda

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Stephen B. Lawton
Theodore Tzalalis

Report prepared for and funded by the Ontario Public School Teachers' Federation

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Chapter 1

OVERVIEW

The purpose of this report is to answer the question posed in the title, "Is Ontario Underinvesting in Elementary Education?". To meet this objective, a series of more specific questions were posed, reviews of relevant literature conducted, and an assessment of the soundness and completeness of existing evidence made. Where gaps in the evidence were noted, or where its reliability was in doubt, proposals are made to conduct additional research.

The specific questions that must be answered prior to answering the major question are:

1. How much is Ontario currently investing in elementary education?
2. How good an investment is elementary education?
3. How is the level of investment in elementary education in Ontario decided?

Strictly speaking, the last of these three questions need not be answered in order to decide whether or not Ontario is making an adequate investment in elementary education; however, an answer to this primary question is of little value unless one understands how the investment decisions are made and how they can be influenced.

Throughout the report, it is emphasized that funds spent on education are not simply expenditures, but investments. Each dollar spent on education is expected to pay a dividend in the future. This emphasis upon the economic value of education is appropriate given the current concerns with the continuing need for economic development in Canada. However, the idea that education is an investment which will pay dividends must be broadened to include the idea that there may be future savings that result from current expenditures on education. As the old proverb has it, "A stitch in time saves nine".

Investment in Education

To assess the level of investment in elementary education in Ontario, data were collected from provincial sources which describe the expenditures per pupil for elementary education in both public and separate schools over the past fifteen years. For comparative purposes, data on expenditures per secondary pupil were also collected. In the full report, expenditures in both current and constant dollars are given, as are levels of service as measured by the number, experience, and qualifications of teaching staff. Also, various ratios, including the pupil teacher ratio, ratio of elementary to secondary expenditures, and the ratio of elementary PTR to secondary PTR, are presented.

Trends in both expenditures per pupil and PTR for elementary education (both public and separate) reveal a modest increase over the past fifteen years. That is, Ontario school boards are, on average, investing more per pupil now than they did in the early 1970s. Some of this increased investment has been made in the form of more teachers per pupil (i.e., fewer pupils per teacher) although most has been made in the form of increased qualifications and/or experience of elementary teachers.

The level of investment in secondary education is, of course, considerably higher than for elementary school. However, in the late sixties, fifty cents was spent on every elementary pupil for every dollar spent on a secondary pupil, whereas in 1980 approximately seventy cents was spent on every elementary pupil for every dollar spent on a secondary pupil. In terms of PTR, the changes have not been so pronounced, although the elementary PTR has moved downwards toward the secondary level throughout the decade of the 1970s. Whether or not this trend will continue may depend upon the impact of declining enrolments on the secondary PTR. It is probable that, with smaller secondary schools, scheduling difficulties may lead to smaller classes and to lower PTR's, thus widening the gap between elementary and secondary pupil/teacher ratios.

Education as an Investment

The literature related to education as an investment can be divided into three categories. First, there are those studies that are primarily concerned with the non-economic benefits of education. We include these here because in some ways they are the most important, including as they do an emphasis on the need for literacy in a democratic society. Second are those that emphasize the direct economic benefits of education, such as the higher wages typically earned by those with more education. Finally, there are those that deal with the indirect economic benefits, and in particular the savings realized, by society as a whole, by virtue of the better health, lower rates of unemployment, and so forth, among better educated individuals.

All three types of studies are concerned with both the social and private benefits of education. A social benefit occurs when a "social good" is provided; that is, when benefits of the good or service being provided are enjoyed by all members of a society. A private benefit is one that occurs when a good or service is privately consumed, and only the individual involved benefits. Education, clearly, is a "mixed good" that has both public and private benefits.

In the recent literature, there are a number of authors who treat education as a private good, and who minimize the "spill-out" or "neighbourhood effects" of education; that is, they suggest that most of the benefits of education accrue to the individual, with relatively little social benefit. However, many of these authors seem ideologically motivated to minimize the role of government in society. Thus, we view their work with scepticism.

Instead, we find the evidence of important social benefits of education to be overwhelming.

A large number of studies are concerned with the effect of education on national income and growth in the economy. These studies suggest that increasing levels of education account for higher rates of participation in the labour force, higher rates of savings, the creation of new ideas and technologies, more efficient utilization of labour, capital, and machines, and higher individual (and therefore national) incomes. Specifically, various

authors estimate that from 13 to 26 percent the growth in the U.S. economy during the mid part of this century could be attributed to increased educational levels in the labour force.

Education could be an important factor but still be a poor investment if the increase in income is less than that which could be earned from alternate investments. A large number of individuals have in fact made estimates of the rate of return for investments in education, and without exception they suggest that, overall, education earns a rate of return at least equal to that of alternative investments in capital, land or machines. This conclusion applies to both the social rate of return, i.e., the rate of return for society as a whole, and the rate of return for individuals. The rates of return vary, however, with level of education. Again, virtually all studies come to the same conclusion: namely, that **investment in elementary education pays a higher rate of return** than does investment in either secondary or postsecondary education. Estimates for the rate of return for elementary education are striking, with the lowest estimate being 24 percent. Clearly, one would have to search hard to find an investment that would pay a higher rate of return.

The direct economic benefits of education, both personally and nationally, are substantial, yet some studies suggest that the indirect effects, such as the reduced demand by more educated persons for some types of social expenditures are equally great. In a section on health and education, we review the strong positive relationship between education and health. Those with more education tend to be sick less often, avoid smoking, and make better use of health facilities when the latter are required. Indeed, one study suggests that expenditure of one dollar on education will do more, on average, to improve the health of the public than a dollar spent on the direct provision of health services. And, in addition to the economic benefits, the personal loss attributable to poor health would be reduced.

Studies parallel to those relating health to education suggest that savings may also accrue in other areas of social expenditures, such as welfare, unemployment insurance, and the confinement of criminals. Those with more education are less likely to be on welfare, unemployed, or convicted of a criminal act and imprisoned. From this we infer that increased levels of schooling would result in lower expenditures for these purposes. These savings

would augment the social rate of return that was calculated for the direct effect of education on national income.

Currently, the level of unemployment even among professionals is a topic in the news. How can this be so given the findings outlined above? As with all the studies in economics and in the social sciences, the conclusions above apply "all other things being equal". Currently, all other things are not equal. The level of growth of economic activity is below what has been experienced in the past four decades. Even in this situation, one still finds that the relationships suggested above are evident, and there is certainly no indication that reduced expenditures for education could be of any assistance in increasing economic activity: indeed, most commentators would argue the opposite.

Determination of Levels of Investment in Elementary Education

The preceding two sections describe trends in levels of investment in education, and the quality of this investment as characterized by its rate of return. Certainly, the evidence indicates that education is a good investment. It is not surprising, therefore, that Ontario, both at the local and provincial level, invests a great deal in education. However, the studies reviewed do not indicate how Ontario school boards decide how much ought to be spent in the education of each elementary or secondary pupil. In considering this matter, three issues are pre-eminent:

1. What average level of expenditure per pupil is to be set?
2. How equitable are the levels of expenditure among different school boards?
3. What accounts for both the average levels of expenditure and the variation in levels in expenditure among all boards?

Average levels of expenditure are determined primarily on an historical basis, and by the effects of several important constraints, such as the provincial rate of grant, the local assessed value, and local mill rate. A thorough analysis of these inter-relationships would require the completion of a substantial set of research studies, including one that would look at the

behaviour of the "median voter" in each school board. However, there can be little doubt that variations in the equalized assessed value among boards are a primary factor in the variation of expenditures per pupil, and that the limits placed on increases in provincial grants and the resistance of ratepayers to increased mill rates have, collectively, reduced average investments. Since provincial grants equalize expenditures only to the grant ceiling, the importance of variation in the equalized assessed value among boards has become more important in recent years, with wealthier boards being relatively free to increase expenditures while boards with less assessment must make do with expenditures at or below the ceiling. No additional means have been introduced to counteract this trend, although the pooling of commercial and industrial assessment has been suggested.

Additional research is needed before a major reform such as the pooling of assessment is introduced, given the recent experiences of British Columbia and California. In B.C., where commercial and industrial assessments were pooled, school boards and municipalities are now resisting additional residential, commercial, and industrial growth since these no longer bring local benefits. Indeed, they result in added costs at least in the interim. As well, some research suggests that major changes in tax structures which increase residential property taxes will depress property values, thereby resulting in substantial losses to homeowners. In short, thorough research is needed to determine the short and long term effects of tax reforms. It is not sufficient to consider only short term gains in the equity of educational expenditures.

Proposed Research Studies

There are five studies that appear appropriate, based upon the results of our review of the literature:

1. A study to determine a likelihood that a person who does not complete grade ten will be unemployed, on welfare, or imprisoned for criminal activity. Moreover, estimates should be made of the economic costs of this failure to complete school.

2. A study to determine the current lifetime investment in education for those who complete university compared to those who complete high school and to

those who do not complete high school. Equity, we believe, must be looked at longitudinally in terms of lifetime investment in education, rather than annual expenditures.

3. A study to consider the effect of a person's character and values and the relationship of these to health and social behavior. The role of the school in shaping character and values would be a major part of such a study.

4. A study to explain variation in levels of expenditure among school boards using economic models such as the "median voter model" and general equilibrium theory. With these, one could then predict the effects of tax reform.

5. A study to look at the actual human and capital resources being devoted to different categories of students in elementary schools. It is not sufficient to know how much, without knowing for whom, it is being spent. Particular attention would be paid to special education students, French immersion students, E.S.L. students, and the "average" student. This study should include measures of pupils intellectual and personal growth.

RESEARCH PROPOSAL I

EDUCATION, UNEMPLOYMENT, WELFARE AND CRIME

Purpose. The purpose of the proposed research is to determine estimates of the savings to society that may occur if additional investments in education result in less unemployment, fewer people on welfare, and less crime.

Scope. The research proposal should include the following activities.

1) Estimate the probability, based on Ontario statistics, that an individual who does not complete his or her education will be unemployed for a long period of time, will require welfare support, or will be involved in criminal activity.

2) Estimate the costs to society in terms of unemployment payments, welfare support, and costs of prison and the judicial system for the individual who does not complete his or her education.

Methodology. The study may be conducted with existing data, if it is available. If not, the methods of collection and costs of collection should be indicated in the proposal.

The proposal should also include definitions of key variables (e.g., levels of education, measures of costs of unemployment, welfare, and criminal activity). Equations used to estimate the effects of education should also be stated, as well as steps taken to control nuisance variables that may affect the relations under study.

Estimated budget. The study may be done rather modestly if adequate data exist; it would be much more expensive it new data are required.

Principal Investigator:	$5,000
Research Assistance:	8,000
Supplies:	400
Computing:	500
Data Collection (?):	12,000
Overhead (25%):	6,500
Total:	$32,900

RESEARCH PROPOSAL II

LIFETIME INVESTMENTS IN EDUCATION

Purpose. To determine the public and private investments made in the education of different groups of Ontarions in order to assess, on a longitudinal basis, how equitable current patterns of expenditure on elementary, secondary, post-secondary and continuing education are.

Scope. This project would have two parts:

1) Compile statistics showing the cumulative investment in education (in constant dollars) for individuals with different levels and types of schooling.

2) Describe the distribution of this investment in Ontario in terms of individuals from different social classes, ethnic and racial groups, and sexes.

Methodology. Provincial data should be analysed to assess the current cost of education at different levels. These data should be cumulated to represent lifetime financial investments for different categories of individuals (e.g., those quitting before Grade 10, etc.) and present value of these investments at various discount rates. Using existing or new data from a survey sample, estimate the value of education for various sub-groups on Ontario's population (e.g., different ethnic or social groups), and discuss the equity of this situation.

Estimated budget. The study may be done rather modestly if adequate data exist; it would be much more expensive if new data must be collected.

Principal Investigator:	$4,000
Research Assistance:	5,000
Supplies:	400
Computing:	400
Data Collection (?):	6,000
Overhead (25%):	4,000
Total:	$19,800

RESEARCH PROPOSAL III

EDUCATION, CHARACTER, VALUES AND SOCIAL BEHAVIOUR

Purpose. This study would seek to determine the economic value of particular character and value traits that schools are likely to teach effectively. While economic reasons are rarely sufficient justification for advocating a particular value, they certainly should be taken into account given the social need for economic activity.

Scope. This project is more tentative than the preceding two propcsals, and should be viewed as an exploratory study that does not seek to determine the overall economic impact of various traits. It has four parts:

1) To review literature relevant to the topic.

2) To carry out a series of exploratory interviews with an appropriate sample of respondents.

3) To identify values and character traits that may have economic value, and to provide "guestimates" of these values. The ethical implications of advocating the sets of values and traits identified should be discussed thoroughly.

4) To develop a proposal for a research study that would provide accurate estimates of the economic value of these traits and values, and suggest policies that would enhance their teaching in schools.

Methodology. The proposal should indicate how the review of the literature will be approached, the researcher's familiarity with the topic, who the researcher would interview and why, what types of questions would be asked and why, and how "guestimates" of the economic value of the traits and values identified would be made. The researcher's opinion of the ethical implications of the study should be stated and discussed.

Estimated Budget.

Principal Investigator:	$8,000
Secretarial:	2,500
Research Assistant:	3,000
Travel:	2,000
Supplies:	600
Overhead:	4,000
Total:	$19,900

RESEARCH PROFOSAL IV

LEVELS OF SCHOOL BOARD EXPENDITURE

Purpose. The proposed research has two major objectives:

1) to understand the reasons for the different levels of expenditures per pupil in Ontario's school boards, and

2) to predict the short and long term effects on these expenditures on reforms in school finance grant regulations.

In the first year, research will concentrate on the application of the "median voter model" to explain expenditures within the context of current grant regulations. In the second year, general equilibrium theory will be used to model the responses of school boards and local ecomonies to possible changes in grant regulations.

Scope. The research addresses important issues, including:

1) the meaning of "equality of educational opportunity" when the level of educational service provided is, in part, a local matter;

2) the rights or desires of residents who are in the minority if decisions are determined by the median voter; and

3) the validity of the assumptions made by governments concerning the fiscal responses of school boards to grants.

Methodology. The power of the median voter model derives from the predictions that one can make concerning the price and income elasticities of demand for publicly funded services. In particular, demand increases as prices fall, and demand increases as incomes rise, all other things being equal. Therefore, one would expect a higher demand for education in communities in which the price of educational services, as measured by the "tax price" to residents, is low than in communities where the price is high. Also, one would expect a greater demand for education in a community with a relatively high average income than in one with a relatively low average income. As well, social variables such as the age, religion, and ethnicity of the median voter, may affect the demand for education at a given price. In all, 11 hypotheses will be tested in order to validate the median voter model.

The demand for education, expressed by the per pupil expenditure $E(C)$, is related to a number of economic variables (tax price p, flat grants z, and income I) and social variables (e.g., percentage Catholics, denoted by X_i): $E(C) = g(p,z,I,X_i)$.

The entire population of public and separate school boards in southern Ontario (n=80) will be studied. Multiple regression will be used to fit a function of the form:

$E(C) = a + dp + fz + gI + \sum_i h_i X_i + my + e$ where y is a dummy variable and e is the error term.

Estimated Budget.

Principal Investigator:	$8,000
Secretarial:	2,500
Research Assistant:	15,000
Travel:	200
Supplies:	1,000
Computing:	2,000
Overhead:	7,175
Total:	$35,875

RESEARCH PROPOSAL V

ALLOCATION OF RESOURCES IN ONTARIO SCHOOLS

Purpose. The purpose of this study is to determine the amount of resources being devoted to different groups of students at the elementary level. In conjunction with the results of other research studies, it should then be possible to determine if these allocations are appropriate in terms of economic returns and equity.

Scope. The study would have two basic parts:

1) To determine, for a sample of boards, the allocation of teaching staff, transportation, teaching materials, etc., for students in different types of programs.

2) To assess this allocation in light of the findings of the first three studies outlined above.

Methodology. A small sample of school boards representative of Ontario school boards would be selected, and students or programs sampled within these boards. Questionnaires, interviews, and budget analyses should be carried out to estimate actual expenditures. Both average cost data (e.g., the board-wide average for teacher salaries) and actual cost data (e.g., the actual salary for a teacher in a class) should be used so that the "true" variability of resources allocated to students can be assessed as well as the average levels of resources.

Estimated Budget.

Principal Investigator:	$8,000
Research Assistant:	15,000
Clerical Assistance:	8,000
Supplies:	1,000
Travel:	4,000
Overhead:	12,000
Total:	$48,000

Chapter 2

ONTARIO SCHOOL FINANCE TRENDS: 1968-1980

To determine how much Ontario has been investing in the education of its youth during recent years, a series of tables were prepared that present per pupil expenditures, in both current and constant dollars, and provide a description of the allocation of these funds among public, separate, and secondary schools. Trends in the numbers of special education students are also noted, as are the numbers of pupils per teacher (the PTR).

Data for this analysis came from several sources, including Education Statistics Ontario, 1981 and Statistics Canada publications that report the Consumer Price Index (CPI) and Education Price Index (EPI). Expenditures per pupil were available for 1981 and 1982 were available from other sources; however, these data are omitted from the report since we could not ensure that they were comparable to figures reported for earlier years in Education Statistics Ontario, 1981.

The analyses are presented in five tables, most with several parts. The discussion that follows relates to each of the tables.

Table 1a. Cost of Living Indices. Since there has been considerable inflation over the 13 year period from 1968 through 1980 covered by this report, it is necessary to use some index of inflation in order to change "current" dollars into "constant" dollars. Three different indices are present in this table. The first is the Consumer Price Index in terms of 1981 dollars; that is, the index equals 100 for 1981. Note that 42.2 cents in 1971 would purchase the same amount as a 1981 dollar, and that it now costs an estimate 117 to purchase what one dollar purchased in 1980.

It is more convenient if we speak in terms of 1971 dollars rather than 1981 dollars since 1971 is the first year for which the Consumer Price Index is given. Hence, the CPI values in 1981 were divided by the value of a 1971

Table 2.1:

ONTARIO SCHOOL FINANCE TRENDS: 1968-1980

YEAR	1968	1969	1970	1971	1972	1973	1974
1a. Cost of Living Indices							
CPI	NA	NA	NA	42.2	44.2	47.6	52.8
CPI/42.2	NA	NA	NA	1.00	1.05	1.13	1.25
EPI	NA	NA	NA	NA	NA	NA	NA
1b. Per Pupil Expenditures							
COST/PSP	574	641	719	766	837	885	997
COST/ESP	506	577	663	730	797	857	968
COST/ELP	554	623	703	756	826	877	988
COST/SEC	1077	1154	1251	1303	1424	1479	1616
1c. Expenditures in Constant Dollars							
CCOST/PP	NA	NA	NA	766	799	785	797
CCOST/SP	NA	NA	NA	730	761	760	774
CCOST/EP	NA	NA	NA	756	789	778	790
CCOST/SC	NA	NA	NA	1303	1360	1311	1292
1d. Ratios of Elementary/Secondary Expenditures							
PUBL/SEC	0.53	0.56	0.57	0.59	0.59	0.60	0.62
ELEM/SEC	0.51	0.54	0.56	0.58	0.58	0.59	0.61
1e. Elementary-Secondary Differential in Current and Constant Dollars							
SEC-ELEM	523	531	548	547	598	602	628
SEC-ELPU	503	513	532	537	587	594	619
CSC-ELEM	NA	NA	NA	547	571	534	502
CSC-ELPU	NA	NA	NA	537	560	527	495

ONTARIO SCHOOL FINANCE TRENDS: 1968-1980 (cont'd)

1975	1976	1977	1978	1979	1980	1981	1982	1983
58.5	62.9	67.9	73.9	80.7	88.9	100	110.8	117
1.39	1.49	1.61	1.75	1.91	2.11	2.37	2.63	2.77
1.32	1.56	1.70	1.81	1.94	2.13	2.38	NA	NA
1219	1437	1604	1772	1995	2208	NA	NA	NA
1213	1422	1576	1750	1924	2138	NA	NA	NA
1217	1433	1595	1765	1945	2184	NA	NA	NA
1841	2127	2344	2517	2752	3032	NA	NA	NA
879	964	997	1012	1043	1048	NA	NA	NA
875	954	979	999	1006	1015	NA	NA	NA
878	961	991	1008	1017	1037	NA	NA	NA
1328	1427	1457	1437	1439	1439	NA	NA	NA
0.66	0.68	0.68	0.70	0.72	0.73	NA	NA	NA
0.66	0.67	0.68	0.70	0.71	0.72	NA	NA	NA
624	694	749	752	807	848	NA	NA	NA
622	690	740	745	757	824	NA	NA	NA
450	466	466	429	422	403	NA	NA	NA
449	463	460	425	396	391	NA	NA	NA

ONTARIO SCHOOL FINANCE TRENDS: 1968-1980 (cont'd)

YEAR	1968	1969	1970	1971	1972	1973	1974
2a. Special Education Enrolment for Public Schools							
PS ENROL	1021676	1042561	1047055	1034703	1022935	998668	977545
PS SP ED	23754	21613	24198	24239	25823	26238	NA
SP ED %	2.33	2.07	2.31	2.34	2.52	2.63	NA
2b. FTE Teachers and PTR for Public Schools							
FTE PS	NA	NA	NA	43804	43416	42042	42120
PTR PS	NA	NA	NA	23.62	23.56	23.75	23.21
3a. Special Education Enrolment for Separate Schools							
SEP ENRO	408914	413556	418433	422137	422166	424217	427294
SEP SPED	7166	6487	6900	6566	6866	6187	NA
SP ED %	1.75	1.57	1.65	1.56	1.63	1.46	NA
3b. FTE Teachers and PTR for Separate Schools							
FTE SEP	NA	NA	NA	18362	18561	18732	18982
PTR SEP	NA	NA	NA	22.99	22.74	22.65	22.51
4. FTE Teachers and PTR for Secondary Schools							
SEC ENRO	500807	530679	556913	574520	583013	585725	589650
FTE SEC	NA	NA	NA	34777	34896	34306	34794
PTR SEC	NA	NA	NA	16.52	16.71	17.04	16.95
5. Ratios of Public and Separate School PTRs to Secondary PTR							
PS PTR %	NA	NA	NA	1.43	1.41	1.39	1.37
SEP PTR %	NA	NA	NA	1.39	1.36	1.33	1.33

ONTARIO SCHOOL FINANCE TRENDS: 1968-1980 (cont'd)

1975	1976	1977	1978	1979	1980	1981	1982
961625	937292	907777	870154	837941	816836	799174	NA
27025	27352	27887	27859	27703	28380	29091	NA
2.81	2.92	3.07	3.20	3.31	3.42	3.64	NA
43519	43318	42556	41137	39949	39435	39365	NA
22.10	21.64	21.33	21.15	20.98	20.71	20.30	NA
427853	422793	421619	420183	420820	423438	425706	NA
6374	7288	7272	7924	8313	8818	8984	NA
1.49	1.72	1.72	1.89	1.98	2.10	2.11	NA
19704	19638	19762	19981	20127	20111	20450	NA
21.71	21.53	21.33	21.03	20.91	21.06	20.82	NA
605160	613055	613830	611668	600084	586261	568635	NA
35467	36046	36215	36296	35840	35219	34693	NA
17.06	17.01	16.95	16.85	16.74	16.65	16.39	NA
1.30	1.27	1.26	1.26	1.25	1.24	1.24	NA
1.27	1.27	1.26	1.25	1.25	1.26	1.27	NA

dollar (42.2 cents). The resulting index, shown in row two, indicates that it now requires $2.77 to purchase what $1.00 purchased in 1971.

The third row presents the Education Price Index prepared by Statistics Canada; 1971 is its base year. This index describes the cost of the same salary and non-salary items required for providing elementary and secondary education in terms of 1971 dollars. Note that it lagged behind the CPI in 1975, but jumped ahead in 1976, only to fall back into line with the CPI in 1981. The non-salary portion of the index for Ontario actually increased from 144.7 in 1971 to 275.7 in 1981, while the salary portion (which dominates the overall value of the index) increased from only 129.6 to 230.2.[1]

For stating the cost of education in terms of constant rather than current dollars, it is preferable to use the Education Price Index, since this ensures that one is purchasing the same amount of education with each constant dollar. However, the CPI is used here since 1) EPI data are available for too few years; and 2) the CPI provides an appropriate value for current dollar in terms of the other types of goods and services, besides education, on which the voters might prefer to spend their money.

Table 1b. Per Pupil Expenditures. Per pupil expenditures in current dollars are given for public school pupils (COST/PSP), separate school pupils (COST/ESP), all elementary pupils (COST/ELP), and secondary school pupils (COST/SEC). Note that in 1971 Ontario was investing $554 in the education of each elementary school pupil and $1077 in each secondary pupil, while in 1980 it was investing -- in current dollars -- $2184 for each elementary pupil and $3032 for each secondary pupil.

Table 1c. Per Pupil Expenditures in Constant Dollars. In this table, the expenditures presented in Table 1b. have been divided by the Consumer Price Index with 1971=$1.00 (row two of Table 1a.) in order to determine expenditures per pupil in constant dollars. The resulting figures indicate that expenditures per elementary pupil increased from $756 (in 1971 dollars) to $1037 in 1980, and that expenditures per secondary pupil increased from $1303 to $1439. Thus during this period at least, Ontario increased its annual investment per elementary pupil by approximately 37 percent and its annual investment per secondary pupil by approximately 10 percent.

Table 1d. Ratios of Elementary and Secondary Expenditures. In order to compare the relative annual investments in elementary and secondary education, the ratios of elementary to secondary expenditures were calculated for each year. (The figures are the same for both current and constant dollars since the latter is a proportion of the first, and the same divisor is used for all levels of education.)

In the first row of Table 1d. public school expenditures per pupil are divided by secondary school expenditures per pupil; in the second row, elementary school (public and separate combined) expenditures are divided by secondary school expenditures. Both trends are similar, and suggest that approximately 50 cents was spent on each elementary pupil in 1968 for each dollar spent on a secondary pupil, while in 1980, about 72 cents was spent on each elementary pupil for each dollar spent on a secondary school pupil.

Table 1e. Elementary and Secondary Differential in Dollars. The absolute differences in expenditures for elementary and secondary school pupils, in both current and constant dollars, are presented in this table. In the first row, the expenditures per pupil in current dollars for all elementary school students has been subtracted from the expenditures per pupil for secondary school pupils. This gap increased from $523 to $848 in 1980. The difference between public school and secondary school per pupil expenditures increased from $503 to $824.

In constant 1971 dollars, a different trend emerges; instead of widening, the gap closes: from $547 in 1971 to $403 for all elementary pupils, and from $537 to $391 for public school pupils.

Table 2a. Special Education Enrolment for Public Schools. To suggest one group that has benefitted from the increased investment in elementary education, trends in enrolment of special education students were computed by dividing public school special education enrolment (PS SP ED) by the total public school enrolment (PS ENROL). Row three of Table 2a. indicates that the percentage of public school pupils enrolled in special education rose from 2.3 percent in 1968 to 3.64 percent in 1980, a 56 percent increase. Given the enactment of Bill 82 in 1980, one would expect even greater increases in the future.

Table 2b. FTE Teachers and PTR for Public Schools. Increased expenditures for education must be reflected in increased or improved resources. To indicate the change in the amount of resources committed to public school education, the Pupil Teacher Ratio for public schools was calculated by dividing total enrolment (PS ENROL in Table 2a.) by the number of full-time equivalent teachers (FTE PS in Table 2b.). Data indicated that the PTR has declined from 23.6 in 1971 to 20.3 in 1980, a decline of approximately 14 percent.

The improvement in the quality of the teaching force can be determined by comparing the overall increase in expenditure, estimated earlier at 37 percent, with the decline in PTR, which is 14 percent. The difference of 23 percent reflects improvements in qualifications and experience.

Table 3a. Special Education Enrolment for Separate Schools. This table is similar to the preceding table, but presents data for separate school pupils. In separate schools, the percentage of pupils enrolled in special education did not increase as much between 1971 and 1981 as it did in public schools. As well, the PTR, which was somewhat below that for public schools in 1971, was slightly greater than that for public schools in 1981. Nevertheless, the trend toward a lower PTR was evident, with a decline of nine percent from 23.0 to 20.8.

Table 4. FTE and PTR for Secondary Schools. The pupil teacher ratios for secondary schools did not decline consistently between 1971 and 1981 as did those for public and separate schools. Indeed, though the PTR for 1981 is about one percent lower than that for 1971, the PTR had first increased from 16.5 in 1971 to 17.1 in 1975, before decline to 16.4 in 1981. Now that enrolments are declining in secondary schools, we can expect a further decline in secondary PTR since it will be difficult to maintain "full" classes in many secondary schools.

Table 5. Ratios of Public and Separate School PTRs to Secondary PTRs. The relative changes in PTR between the elementary and secondary panels are displayed in this table. In 1971, the public school PTR was 1.43 times that of the secondary school PTR, whereas in 1981 it was 1.24 times as great. For separate schools, the decline was from 1.37 to 1.27. Thus, about 25 percent

more human resources are devoted to the education of a secondary pupil than to the education of an elementary school pupil.

The preceding analysis suggests that Ontario school boards have, in effect, adopted a policy to invest more resources in education in general, and in elementary education in particular. At the same time, more is being invested in the education of secondary pupils than in the education of elementary school pupils.

The analysis has focussed exclusively on expenditures and what is purchased and has not considered where revenue is obtained. Clearly, the readiness with which funds are available affects the level of expenditures. The decline in provincial funds, from 61 percent of expenditures in 1975 to 52 percent in 1981[2], and the proposal to pool business and commercial industrial assessments and to fund separate schools to grade 13 may affect future actions of Ontario school boards when they decide how much to spend per pupil, particularly at the elementary level. Thus, a thorough analysis of the possible effects of these and other potential constraints on school board revenue is needed.

Notes for Chapter 2

1. Statistics Canada Service Bulletin: Education Statistics - 81-002, Table III.

2. Education Statistics Ontario, 1981, Table 8.01.

Chapter 3

EDUCATION AS A SOCIAL GOOD

Educational policy, within the overall governmental policy, has two main objectives: 1) to meet the needs of the individuals for their own development and 2) to meet the needs of the society for its overall development. It is mainly through the positive effects that education has on individuals that society as a whole is benefitted. These effects are felt on different levels -- social, economic and political. The purpose of this chapter will be to examine and analyze the effects of education on society as a whole.

Education is a social good in the sense that all in a community can benefit from the available educational services without significantly reducing the benefits that can be reaped by others. That is, it is a social good to the extent that it provides benefits of a collective nature.

The fact that society is benefitted from education is a justification for having elementary and secondary students taught at public expense. This total public support of education suggests that the collective benefits of education must by very important, though the problems of measuring these effects have not been solved due to their complexity and the limitations of present methods. As Bowman has stated, "it has proved impossible to assess social non-monetary real returns to education (let alone psychic returns). This is due to the non-measurability of most non-monetary returns".[1] Nonetheless, many studies regarding the social benefits of education, both quantitative and non-quantitative, have been undertaken and have produced data that are very persuasive as to the high social value of education. Most quantitative economic analysis has focussed on the effects of education, viewed as an investment in human capital, and on economic growth and productivity, earning capacity, and so forth. These studies, touched upon here, will be examined in more detail separately.

Education is valuable to the student since the acquisition of skills increases future earnings and therefore enhances future well-being. Additionally, it

refines taste, increases knowledge and provides moral and psychological satisfaction. Among these effects, according to Bowman, are "the additional things the individual can produce for himself because of increased skill or more leisure, psychic returns from the sort of job he is able to hold, and other enjoyments attributable to his education such as reading, music appreciation, etc."[2] Moreover, education determines the entire future life paths of the individuals by affecting their behaviour within their families (as well as their decisions about their mates) and within the society at large. While an individual is at school, education can also be considered as a consumption good which gives satisfaction to the student. That is, "as an activity education may yield benefits for the same reason attending a sport event or reading a book yields benefits".[3] But to what extent does education benefit society?

Education has substantial "neighbourhood" and "good citizenship" effects. More educated people tend to develop "healthier" social values that make them better neighbours and citizens. Having educated neighbours means better communication with them, which in turn creates a more pleasurable neighbourhood environment. Additionally, parental education affects the behaviour of their children in the neighbourhood. This effect on the behavioural norms of the children has present and long-run effects for the behaviour and good citizenship of the student's future children.

Education has positive effects on the behaviour of the individual not only in the neighbourhood but also at the workplace. Each worker benefits from the education of his or her fellow workers due to the better behaviour and cooperative spirit expressed by more educated individuals. Also, when team effort is required in the production process, the abilities acquired through the education of one individual benefits everyone since it increases overall productivity, thereby providing monetary and/or non-monetary benefits.

People with more education contribute more to their local communities through participation in civic and charitable organizations. As Bowman argues, "better educated men are most likely to make substantial contributions to the social product through voluntary community services, involving social returns to education".[4] Moreover, better educated people are more likely to participate more in the political process and provide valuable service to their community

by virtue of qualities and skills they have acquired through the educational process.

It has also been argued that education contributes to the strengthening of our democratic institutions. According to Weisbrod, "the relationships between peoples' educational attainments and their participation in activities that help make a democracy strong are striking".[5] One of the relationships indicative of the above observation is that voting participation is highly correlated with education. As has been found in the U.S., "people who have gone to college tend to exercise their right to vote considerably more often than those with no college experience".[6] Stapleton[7], in his quantitative analysis, found the same relationship; namely, the higher the educational attainment, the higher the percentage of persons who vote. Another factor contributing to political democracy is the "natural outcome" of education in providing an electorate that is more informed about the parties and the prevailing political issues.

On a more personal level, parental educational level is believed to be an important factor in determining the education of children. As has been shown by Leibowitz[8], parents with more education (and especially the mothers) devote more time to their children. This informal education at home contributes to the children's school performance and to their overall educational attainment. Withey argues that students tend to do better at secondary schools when their parents are better educated and, "they tend to go to college in greater proportion since their parents are better equipped ... when it comes to helping sons and daughters with their education".[9]

Literacy is another product of education that affects both the individual and society. Literacy is necessary for the transmission of most types of information, and effective communication is essential to the efficient operation of any political or economic system. According to Weisbrod, "without literacy the significance of books, newspapers and similar media for the transmission of information would dwindle".[10] Friedman asserts, "a stable and democractic society is impossible without a minimum degree of literacy and knowledge on the part of most citizens and without widespread acceptance of some common set of values".[11]

Literacy also contributes to the overall quality of the labour force and its ability to increase productivity. A UNESCO study concluded, "productivity is greatly improved when the labour force is literate and has been through the process of schooling and disciplined thought which formal education provides".[12]

More education also assists an individual to become a more efficient consumer in the sense that he or she becomes more able and willing to become informed about the availability and pricing of consumer goods and services. As Michael argues, "there is a substantial evidence that new products are often adopted relatively quickly by the more educated people".[13] Bowman also notes that on the average, "more educated people seem to get somewhat higher returns from given levels of income than other people.... This occurs because educated people probably have greater ability than others to cope with such complexities as taxes, the legal system, bureaucracies, the credit system, investments and misleading advertising".[14] It is reasonable to conclude that more efficient consumption results in the better allocation of available resources.

Numerous researchers report a positive correlation between education and income. Houthhakker, in "Education and Income"[15], substantiates this finding. Though the higher income associated with more education is primarily a private benefit, society does benefit in the sense that educated people tend to have higher income and therefore pay higher taxes in the community in which they live. This in turn increases expenditures on public services. The tax contributions of educated persons makes education a matter of concern of the whole community.

If education is accessible to everyone, then increases in the educational levels of the citizenry tend to reduce income inequalities. Mincer believes that, "education has powerful income distribution consequences in the long-run".[16] Soltow also found that, "education is a strong factor in decreasing inequalities of income as the average educational level is raised".[17]

Increasing expenditures will help schools to become more "efficient" in the sense that fewer individuals would remain uneducated and have their potential contribution to society wasted. Schultz argues, "efficient schools would

substantially reduce the inequality that now prevails, because in general it is true that the children of the most disadvantaged families are shortchanged most seriously by the existing inefficiency of our school systems".[18] Chiswick believes more funds should be allocated to elementary education since, "expenditures of public funds on elementary schooling tend to reduce, whereas public funds as they are presently used (in the U.S.) in higher education may tend to increase, the inequalities in the distribution of personal income".[19]

Another effect of education that benefits the individual and the society is the option of the educated person to continue his or her education at any time. This option is of value to the individual in the sense that additional education may increase an individual's returns, whether they be monetary or not. In particular, the more education a person receives, the greater the chance that he or she will obtain a job and/or a more highly paid job with better working conditions. As well, further education enriches life (though some argue it is more costly to live the life of an "educated man").

Of particular benefit to society is the ability of more educated individuals to upgrade their knowledge at any time in order to adapt to technological change. As Weisbrod points out, "new technology often requires new skills and knowledge; and those persons having more education are likely to be in a position to adjust more easily than those with less education, and to reap the returns from education which the new technology has made possible".[20] This flexibility of educated people and their overall high level of productivity makes them more capable of changing jobs without experiencing unemployment. Furthermore, there is considerable evidence that education reduces the overall level of unemployment, all other things being equal. Chiswick found that in the U.S. in 1972, those who had completed grade eight had an unemployment rate of 6.2 percent while those with 16 or more years of education had an unemployment rate of 2.4 percent.[21] Thus, by educating its labour force, society reduces the amount of funds required for social welfare, thereby avoiding large expenditures.

From the above analysis we see that education benefits not only the individual, but society as a whole. It is the contribution that education makes to society that justifies public support for education.

Notes for Chapter 3

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2. Ibid., p. 650.

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4. Mary Jean Bowman, op. cit., p. 653.

5. Burton A. E. Weisbrod, External Benefits of Public Education, An Economic Analysis, Princeton University Press, Princeton, New Jersey, 1964, p. 95.

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7. David C. Stapleton, "Analyzing Political Participation Data with a MIMIC Model". In Sociological Methodology, Karl F. Schleussler (Ed.), Jossey-Bass, San Francisco, pp. 52-74.

8. Arleen Leibowitz, "Education and the Allocation of Women's Time". In Education, Income and Human Behaviour, Juster F. Thomas (Ed.), McGraw-Hill, New York, 1974, pp. 171-98.

9. Stephen B. Withey, "Some Effects on Life-Style". In A Degree and What Else, Stephen B. Withey (Ed.), McGraw-Hill for Carnegie Commission on Higher Education, New York, 1971, p. 87.

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12. "The Economic Impact of Primary Education". In Readings in the Economics of Education, UNESCO, 1968, p. 148.

13. Robert T. Michael, op. cit., p. 132.

14. Howard R. Bowen, Investment in Learning the Individual and Social Value of American Higher Education, Jossey-Bass, San Francisco, 1977, p. 217.

15. S. H. Houthhakker, "Education and Income", Review of Economics and Statistics, Vol. 41, February 1959, pp. 24-28.

16. Jacob Mincer, "Investment in Human Capital and Personal Income Distribution", Journal of Political Economy, August 1958, pp. 281-302.

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19. National Bureau of Economic Research, Human Resources, Columbia University Press, New York, 1972, p. 32.

20. Burton A. E. Weisbrod, op. cit., p. 23.

21. B. Chiswick, Human Resources and Income Distribution, 1977, p. 92. (Tables 5-6).

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Chapter 4

EDUCATION AND HEALTH

Many researchers have hypothesized that health is positively correlated with schooling. Bowen and Finegan have stated, "that there is a powerful interaction among health, schooling and labour-force participation".[1] Several other studies have shown the same positive relationship, including those by Fuchs[2], and Breslow and Klein[3]. To what extent schooling may affect health can be judged from the suggestion by Auster, Leveson and Sarachek that, "the rate of return on increases in health via higher schooling outlays far exceeds the rate of returns on increases in health via higher medical outlays".[4]

Despite the above strong suggestions, there are some other authors who have argued that the relationship between health and schooling is so complex that it is very difficult to establish causation. Is it schooling that increases health or vice versa? Nonetheless, it has been repeatedly shown that more educated people are healthier than less educated ones and most researchers have concluded the direction of causation appears to be from education to health.

There are sound reasons for this view. First, it appears that educated people are more skilled in using medical resources and, therefore, are better able to detect signs of illness.[5] It has also been shown by Powers[6] that educated people visit doctors more frequently, are more informed about their health status, and in a better position to prevent illness. In addition, those with more education are more aware of the beneficial or harmful effects of different activities or habits such as exercise and smoking. In regards to smoking, it was found in a 1961-62 survey of consumer expenditures in the U.S. that education was inversely related to dollar expenditures for tobacco even when income was controlled.[7]

Also, since education provides knowledge in many areas, such as diet and hygiene, a better and healthier life is usually generated. According to a U.S. national survey in 1955, "education was positively related to reading about health in magazines".[8] Another survey in 1959 found that "the more formal

schooling individuals had had, the more likely they were to recall seeing articles about dental hygiene in papers or magazines and frequently reading such articles in the press".[9] Thus, more educated people are more likely to be better informed about health issues and more able to protect themselves in more efficient ways than less educated individuals.

More educated parents are also able to take better care of their children. Since the health of children depends to a large extent on their early environment and since this environment is shaped to a large extent by their parents, children's health is positively related to the amount of schooling of their parents. In fact, Kitagawa and Hauser found a negative relationship between the educational level of parents and infant mortality rates.[10]

Education plays an important role in mental health, as has been shown by Dupuy and others and summarized by Withey.[11] Dupuy reports that symptoms of psychological distress, such as headaches, dizziness, and nervousness are more prevalent among the less-educated than the more-educated". Cobern, Salem and Mushkin note that, "data on admission to public mental hospitals show sharply lower rates of admission for college-educated people than for others".[12]

Psychological well-being tends to increase with education and this undoubtedly affects the overall health status favourably. One explanation offered for this observation is that schooling increases self-confidence, thereby reducing the stress associated with social and/or work situations.

The studies mentioned above show that health and education are positively correlated and that more schooling probably leads to better health. One of the most persuasive and sophisticated quantitative studies that supports this conclusion is that of Grossman who estimated a recursive health-schooling model by ordinary least squares multiple regression.[13] In his model, he measured "health capital" by self-rated health status. As independent variables he included "current" and "past" variables that may affect health. Current variables were the hourly wage rate, wife's schooling, weight difference (i.e., amount overweight, as measured by an obesity index), and job satisfaction. Past variables were past health, parents' schooling and visual perception.[14] Grossman found that the efficiency with which individuals transform medical care and other inputs into better health rises with schooling. More

specifically, he found that "schooling raises health by 3.5 percent holding nothing but age constant or by 1.2 percent when all the other variables are held constant".[15]

Another important finding by Grossman was that, "schooling raises productivity in the production of health by 2.4 percent at a minimum".[16] Comparing this effect with the market productivity of schooling, (there is a 5.5 percent increase in the hourly wage rate due to each additional year of formal schooling), Grossman contends that the overall non-market productivity effect of schooling is substantial and it is approximately 40 percent of the market productivity effect.[17]

Grossman also found that wife's schooling has a great impact on husband's health. This variable, together with the job satisfaction and the obesity index, account for nearly 40 percent of the variation in health.

Moreover, Grossman examined the extent to which schooling is related to mortality rate. He wanted to determine whether or not the strong positive relationship he observed between schooling and health when health was measured by self-rated health status was also observed when health was measured by mortality or survival. He concluded that "a one-year increase in schooling lowers the probability of death by .4 percentage points".[18] Therefore, he argues, this finding provides further justification for the identifying of education as a major determinant of health.

Kitagawa and Hauser also examined the relationship between mortality and education and confirmed Grossman's results. Specifically, they found that with an average mortality rate of 1.00 for all persons, those who had completed a grade level between 0 and 7 showed an 1.05 rate while those with grade 13 or more showed an .87 mortality rate.[19]

In a cross-sectional analysis of the 1970 U.S. Decennial Census 5-percent sample (which reports the people with work disabilities), Lando found that there is a striking negative relationship between work disability and schooling: "The proportion with any or complete work disability declines as the years of schooling increase".[20] He concludes that the data support the assumption that health is directly related to the level of education. In

examining the relationship between education and health, Lando took into account other factors that affect disability rates such as age, sex and race. After standardizing these variables, increased schooling was still associated with better health. Accepting the limitations of his cross-sectional approach, Lando maintains that we can only speculate about the reasons why the level of education is related to health. He suggests three reasons may be:[21]

a) investment in human capital increases efficiency in consumption;
b) the better educated may work at less physically taxing jobs; and
c) the less educated may tend to be in occupations that are more prone to result in disability.

As we see there is substantial evidence that suggests rising levels of education tend to improve the health of the population. Given that one of the goals of the government is to raise the general health level of the people, one of the most effective and efficient ways to achieve this goal is to increase the educational level of the populace.

Notes for Chapter 4

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Chapter 5

EDUCATION AND CRIME

There are many identifiable factors that are related to higher incidences of crime in society. Among these are poverty, unhappy experiences, "bad" environments, and vicious personalities. On the other hand, one of the factors that is associated with lower crime rates is education.

Many officials, educators and researchers have argued that more education reduces the likelihood an individual will participate in illegitimate activities. Ehrlich notes that, for crimes against property, the incentive to enter illegal activity is negatively correlated with schooling or any other legitimate training.[1] He bases his argument on the well-documented proposition that a person with a lower level of schooling would have an income potentiality well below the average and therefore would have a strong incentive to commit burglary or other crimes against property.

Following this "economistic" approach, Ehrlich considers "the way education affects the relative opportunities available to offenders in different illegitimate activities".[2] He argues that it is more likely that those with more education will not commit crimes due to the high opportunity cost of their time in terms of current or future returns on their investment in human capital. That is, they can earn more in a regular job than they can as thieves.

The negative relationship between level of education and crime is evident when the different educational characteristics of inmates are examined. Allen found that a large percentage of prisoners in correctional institutions in the U.S. "are illiterate, educationally retarded, vocationally untutored and vocationally inexperienced".[3] Additionally, the census data on schooling attainments of all inmates, again in the U.S., indicated that "the median number of years of school completed by males in the age group 25 to 34 was 8.9 for non-whites, and 8.7 for whites".[4]

A study in Ontario which dealt with 802 inmates who were admitted to the Guelph Correctional Centre during 1970-71 found that less than 20 percent had completed grade 10, and over 10 percent had not even completed elementary school.[5] In particular, the highest grades completed were as follows:

Completed	Number	Percent
less than 6	21	2.8%
6 or 7	57	7.7
8	191	25.8
9	218	29.4
10	135	18.2
11	42	5.7
12	46	6.2
13	12	1.6
some university	8	1.1
other/unknown	11	1.5

In another study which examined the characteristics of 1,905 probationers in Ontario, it was found that most of them had not graduated from high school and were working in poor-paying, low-level occupations. The mean grade level of probationers was 10. It was also found that 67.1 percent of the probationers examined had quit school, only 8.1 percent had attained a grade level of 13 or over, and 3.1 percent had not gone beyond the grade 6 level.[6] The highest levels of educational achievement were as follows:

Completed	Number	Percent
grade school	1,203	66.2
vocational high	156	8.6
high school	231	12.7
apprenticeship	34	1.9
community college	16	0.9
university	19	1.0
don't know	159	8.7
no response	87	--
TOTAL	1,905	100.0

The extent to which level of education is negatively related to crime also can be seen among juvenile delinquents. Eichorn reports a study by Roman in which it was found that, "84 percent of the cases at the treatment center of a New York Children's Court had reading disabilities".[7] By tracing the development of an individual's delinquent behaviour, Roman found the triad: reading retardation -- truancy -- delinquency.[8]

Simpson and Van Arsdo, in another study in which the effects of sex and race were isolated, concluded, "the delinquents are over-represented in the school dropout category".[9] Dropouts, they noted, are more likely to be frustrated individuals who first become anti-social and then become delinquents.

A study in Ontario supports this thesis. In examining the characteristics of the average juvenile probationer, Renner found that a high proportion of them had encountered difficulties in school. Their performance was low and most had learning problems that had been diagnosed. Additionally, suspensions and expulsions from school were common among them, as were frequent absences, motivational difficulties and discipline problems.[10]

The above-mentioned studies suggest that one of the main characteristics of the delinquents is that they are academically retarded. This in turn implies that the school could play a very important role in reducing delinquency by raising the educational level of the students. School might also play a decisive role in developing the character and personalities of the students in such a way as to reduce deviant behaviour. By providing rational guides for behaviour, schools can perhaps increase the adaptability of children to their school's communities, helping them both to avoid criminal behaviour and to become constructive citizens.

In trying to reduce crime through education, other characteristics of the delinquent children should be taken into account. Delinquents are characterized "by low family income, lower educational attainment of the head of the household, and greater family instability".[11] Therefore, schools should pay more attention to those children who come from poor socio-economic backgrounds and who lack self-confidence.

Generally, education can reduce crime by helping individuals to increase their adult income, helping them to think and act in a rational way, preparing them to make wise decisions, and conditioning them for successful social and family lives. In short, both the mind and character of students must be developed if additional investment in schooling is to be justified on the basis of its effects on criminal behaviour. The importance of elementary education should be emphasized since it is during these years that the problems first become apparent.

At this early stage of children's development attention can be offered more readily to those that experience learning problems with the intention of remedying their difficulties. Additionally, the children should be observed closely by their teachers, who can play a very important role in preventing delinquency by "reaching children before maladjusted behaviour expresses itself overtly or becomes too deeply rooted".[12]

The emphasis on elementary education will not only reduce the incidence of delinquent behaviour of children but it will also have long-lasting effects on their adult life and the life and behaviour of their children.

Finally, it is easily understood that by reducing crime the demand for public funds to guard against crime could be reduced. While we could locate no studies that compared the relative rates of return for investing in education to reduce crime as opposed to confining prisoners, one can be assured it costs less to teach a child to read than to imprison an individual for life.

Notes for Chapter 5

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Chapter 6

EFFECTS OF EDUCATION ON ECONOMIC GROWTH

There are many economic and non-economic benefits that accrue to the individual and to society from increases in the educational attainment of the population. One of the extremely important social benefits of education provided by the school system and/or any other forms of education is its contribution to economic growth.

Economic growth is the increase in the productive capacity of an economy and, hence, in the national income. That is, the increase in the national income is a measure of economic growth. According to Machlup, the factors that affect economic growth are,

1. the use of more labor
2. the use of more physical capital
3. the use of better labor
4. the use of better machines and
5. the more efficient allocation and use of labor materials.[1]

Most of these factors, as it will be shown, are positively related to education.

One main effect of education is its positive impact upon the labor-force participation rate. Bowen and Finegan[2] report a positive relationship between years of schooling and the labor-force participation. According to them, educational attainment is strongly associated with labor-force participation even after allowance has been made for the influence of other variables such as age, race and marital status. Though differences in participation rates among adjacent levels of education were not expected to be statistically significant, they in fact found that great variations in the participation rates existed until the high school educational level was reached. After the high school level, differences were very small. More specifically, they estimated that,

for the prime-age males (men 25 to 54 years of age), the relationship between schooling and labor force participation is as follows:[3]

Population group, by years of school completed	Adjusted labor-force participation rate
0-4	90.3
5-7	94.4
8	95.6
9-11	96.6
12	97.2
13-15	98.5
16	98.9
17+	99.1

According to the authors, the main reason for the high correlation between educational attainment and labor-force participation rate is that educational attainment and the ability to find and hold a job are related. Moreover, they argue, "educational attainment is presumably related to intelligence, and physical and mental health, and these characteristics in turn are presumably related to labor-force participation."[4] Another reason could be that the opportunity cost of not working is greater for an educated person than for one with little education since, as it has been extensively documented by many researchers, education is related to higher earnings.

In the same study, the authors tried to estimate the extent to which education affects the labor-force participation of married women from 14 to 54 years of age. In this case, the variation in participation rates was much larger as the level of education increases, than was the case for prime-age males.[5] They argued that the strong positive relationship between the two variables for women was due to potential increases in the market earnings from additional years of schooling, to the importance of psychic returns, and to the ability to find a pleasant and interesting job when more education has been obtained.

In addition to Bowen and Finegan, numerous other authors, such as Oppenheimer[6] and Perrella[7], have concluded that women with more education are more likely to be in the labor force. In all these studies, as Leibowitz has stated, the authors accept that "education raises productivity in the labor market more

than productivity in the home, so that the 'cost' of not being in the labor market rises and women are induced to seek employment outside the home".[8]

Education affects "the use of more labor" not only by increasing the labor-force participation rate, but also by increasing the hours per week worked. Mincer estimates that "as much as half of the variation, in weeks and hours of work during a given year, can be attributed to human capital differentials".[9] Part of the explanation for this relationship can be attributed to greater market earnings that are associated with education and to better working conditions for those with more education.

Additionally, it has been shown that the rate of employment of better educated people is higher than the rate of employment of the less educated ones. This can be attributed partly to the higher productivity and skills of the educated and their ability to be better informed about the state of the labor market.

Regarding the use of more physical capital, it is partly the effect of education of the "savings behavior" of individuals that may affect the volume of investment. Solmon has found that "there is a strong positive relationship between education and savings, other things being equal".[10] According to Solmon, education influences numerous aspects of the behavior of individuals. He argues that education affects foresight, concern for heirs and retirement, and habits of thrift, all of which in turn affect savings behavior. Additionally, the ability of better-educated people to select a better portfolio will give them higher rates of return and, therefore, their savings will grow faster. Also, Solmon used the theory of the Permanent Income Hypothesis by Friedman to show that "those with more education should save more, since they are more likely to be self-employed and to have a larger transitory component of income".[11]

As to the effects that education has on the productivity of capital and therefore on economic growth, Machlup argues that "education can contribute in at least two ways: a) by making people more interested in improved equipment, more alert to its availability, and more capable of using it; and b) by training people in science and technology and expanding their capacity for the research and development work needed to invest, develop, adapt, and install new machines".[12]

It is mainly through "the use of better labor" that education affects economic growth. Education improves the quality of labor, therefore increasing labor productivity. Labor productivity refers to changes in output per unit of labor.

Education can improve productivity by enabling workers to produce more and better goods per unit of time by providing the workers with better work skills and greater dexterity. That education contributes to the development of individual skills is obvious. Increases in the number of engineers, physicians, technicians and other professional personnel is a direct product of education. But there are many other factors less obvious than skills that affect productivity. These factors include better health, higher accessibility to information, and greater adaptability to technological change.

Education also can affect productivity by virtue of better working conditions that educated people enjoy and demand. A better environment on the production site motivates people to work better and with more energy. People produce not only more goods and services but also goods and services of better quality. Additionally, better educated people, due to the nature of schooling, are inclined to be more disciplined, more reliable and more compatible with working requirements; they are therefore more efficient.

Educated people can make better decisions as to what careers to follow, thereby utilizing their abilities and skills more productively. Also, by being able to utilize information more efficiently and being more flexible in times of changing economic conditions, they can move to more productive occupations when the need arises.

Education also affects business organization by advancing the knowledge related to the techniques of management. These advances in management knowledge affect the productivity of administrators. Furthermore, as Schultz has stated, "there is a considerable number of studies that show that the supply of entrepreneurial ability is definitely increased by additional schooling".[13] This enables the entrepreneurs to take better and more efficient decisions, thereby enhancing their productivity.

Generally, education appears to exert a decisive influence on productivity and therefore on economic growth. Peter Chinloy has tried to quantify the effect of education and other variables on labor productivity in the U.S. from 1947 to 1974. He found that education was the largest main contributor to increases in labor productivity for this period, accounting for 14 percent of its increase. For the three year period from 1971 to 1974, Chinloy argues that education alone accounted for almost two-thirds of the entire increase in labor productivity.[14]

Another factor affecting economic growth is the efficiency with which materials, machines and labor are allocated. According to Machlup, "education results in the more efficient allocation of materials and machines due to the availability of trained personnel and improved organization and managment".[15] Furthermore, educated people respond better to the demand for labor and are therefore more likely to relocate in order to work.

Labor mobility has equilibriating effects on the labor market resulting in a more efficient allocation of labor; high mobility therefore enhances labor productivity and economic growth. That educational attainment has positive effects on labor mobility has been extensively shown by many authors. Weisbrod argues that census data in the U.S. show that "except for the lowest education group, migration rates rise with level of education in every age class".[16] Lancing and Mueller, in their extensive study on geographic mobility, have also shown that education is one of the major determinants of mobility rates. More specifically, they estimated that the proportion of adult males aged 25 or over who migrated between counties from March 1964 to March 1965 varied with education as follows:[17]

Education	Percent who migrated
Elementary: 0-8 years	4.0
High school: 1-3 years	4.8
High school: 4 years	6.0
College: 1 year or more	8.8

The authors argued that the positive correlation between education and mobility is mainly the result of the low demand for highly trained personnel at the

local level. Therefore, there is a transfer of skilled personnel to areas where the demand for these services is high.

From the above analysis we see that education affects the rate of economic growth mainly through its effects on labor force participation, on the saving habits of people, on capital productivity, on the productivity of labor, and on the efficiency with which labor, materials and machines are used. Many authors have tried to quantify the effect of education on economic growth by measuring the increases of national income attributable to education.

Schultz, in 1961, tried to estimate the contribution of education to economic growth in the U.S. from 1929 to 1957. He found that during that period "labor had earned 71 billion dollars more than it would have had the earnings per person in the labor force not risen".[18] He then tried to estimate how much of this "unexplained" increase was attributable to the increased education of the work force. Accordingly, he estimated that the total stock of education carried by the labor force in 1930 had a value of 180 billion in 1956 dollars. To maintain a constant value (that is, for the labor stock of education to be the same in 1957 as it was in 1929) 69 billion dollars were needed, increasing the value of the total stock of education to 249 billion dollars. However, the total stock of education from 1927 to 1957 had risen by 355 billion dollars (in 1956 prices), an increase of 286 billion dollars. In order to find to what extent education affected national income, Schultz made three estimates of the rates of return of the 69 and 286 billion dollars that were invested in the education of the labor force during the period in question. He concluded that the increase in the education per person of the labor force explained 36 to 70 percent of the unexplained increase in earnings per laborer.[19]

According to Bowman, the estimates by Schultz suggest that "education accounted for 21 to 40 percent of national income growth in the United States over the period 1929-56, and that increases in education per member of the employed labor force accounted for 17 to 33 percent of income growth over the same period".[20]

In 1962, Denison also tried to estimate the impact of education, among a variety of other factors, on economic growth.[21] He dealt only with formal

education and treated the effects of advances in knowledge that can also be affected by education separately.

Denison classified the income of males 25 years of age and over by their age and number of years of school completed. Since there are other factors, besides the length of education that affect income differentials, Denisen made adjustments to measure the earning differentials attributable only to education. At this point he made one of the main assumptions underlying his study, namely, that sixty percent of the earning differentials from work were due to differences in education, as distinguished from other factors such as energy, natural ability, etc.

Denison adjusted the average earnings of males over 25 using the above assumption, and also adjusted them in such a way to ensure a constant fraction for the actual 1949 earnings of eighth grade graduates. By doing so, he was able to isolate the effects of additional schooling on the average income. The above steps and numerous other adjustments for factors, such as the lengthening of the school year over time, enabled Denison to calculate the effects of education on economic growth.

He found that, from 1929 to 1957, improved education raised the average quality of labor by 29.6 percent, or at an average annual rate of 0.93 percent. The average share of labor in the national income over this period was 73 percent. Taking 73 percent of the 0.93 percent, yields 0.68 percent as the average annual contribution of education to economic growth. Given that the average growth rate of national income from 1929 to 1957 was 2.93 percent, the contribution of education to economic growth accounted for 23 percent of the annual growth rate .

Moreover, Denison related improved education to the national product per person employed. He found that it contributed 42 percent of the 1.60 percentage point growth rate in product per person employed.

It should be mentioned that Denison attributed 0.58 percentage points of the 1.60 percent average annual growth in national income per person employed to the "advance in knowledge". According to Becker, "if the growth in knowledge was considered an indirect effect of the growth in education, the share

attributable to education would almost double. This in turn implies that the estimated average rate of return on education would almost double".[22]

As can be seen, Denison's estimate of the contribution of education to national income growth lies within the 17 to 33 percentage range that Schultz estimated for the same period.

It should be emphasized the Denison took into account only the improvements in the quality of labor when measuring the effects of education on economic growth and not the influence of education on other variables that education affects, such as on the labor-force participation rate. Therefore, according to Denison's estimates improvements in the productivity of labor that occurred through education are very significant for the overall growth in the economy, accounting for as much as 23 percent of the increase in real national income.

From the studies by Schultz and Denison, it can be concluded that education has been a major contributor to economic growth. The extent to which education was vital to economic growth, at least for the period examined, can be seen by examining the estimates of the other factors that influence economic growth. As Schultz has pointed out, "schooling during that period had been a larger source of growth than material capital represented by structures, equipments and inventories".[23]

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12. Fritz Machlup, op. cit., p. 8.

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14. Peter Chinloy, Labor Productivity, Abt Books, Cambridge, Massachusetts, 1981, pp. 68-69.

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Chapter 7

PRIVATE AND SOCIAL RATES OF RETURN ON INVESTMENT IN EDUCATION

Any decision by the government regarding expenditures on education would reflect the objectives of the government, the needs of the overall economy and the overall demand for education. Also, the government might take into account the rates of return for expenditures in the various areas and at various levels of education to ensure that the most favourable investment is made. Therefore, another important way of assessing the impact of education on society is by measuring the returns of "investing in education". In these studies, the authors use the human capital approach which considers expenditures on education as an investment in human beings that can provide future returns.

In determining the private rates of return for different levels of education, Becker found that the rate of return to white male high-school graduates in the U.S. was 28 percent while for college graduates it was 14.8 percent. He also maintained that the rates of return for the elementary school graduates would be greater than that of both the high school graduates and the college graduates. It should be noted that these estimates were unadjusted for differentials in ability. Therefore, according to Becker, his estimates suggest that there might be diminishing returns or diminishing marginal products from additional years of schooling. However, he maintained that if fully adjusted rates for differential abilities are used, there might be increasing returns to additional years of schooling.[1]

Hansen has also estimated private rates of return from schooling in the U.S.; he found that, "the after tax returns were 4.5 percent for high school and 11.5 percent for college".[2] He also estimated private returns for other levels of schooling and maintained that "for the levels of schooling under eight years, private rates of returns are infinitely large since opportunity costs are assumed to be zero, school-related costs are negligible, and tuition and fees are not charged".[3]

Numerous other authors have estimated the private rates of return to education which nonetheless show divergent results. The results of these studies are presented on Table 7.1.[4] These estimates should be used with caution with regards to the "actual" effects of formal schooling on earnings since most of the studies concerned do not take into account other factors that influence earnings, such as experience, natural ability, social class, and so forth. For example, Mincer has argued that studies have not accounted for the effects of seniority, noting that "in each schooling group annual earnings nearly double after he or she has had two to three decades of experience".[5] Additionally, Renshaw maintains that "while the estimates serve effectively to demonstrate that education is of great importance to the economy, it must be borne in mind that the estimating procedures so far devised are biased in favor of education".[6]

Table 7.1

Private Rates of Return to Educational Investment

Author	Primary	Secondary	College
Hansen	Infinite	14.5	11.5
Schultz	35.0	25.0	15.0
Hines	155.1	19.5	13.6
Hanoch	100.0	16.1	9.6
Psacharopoulos	23.7	16.3	17.5
Johnson		21.0	16.0
Eckaus	31.5	4.0	12.0

It has also been argued that the social rates of return from schooling would be different from the private rates of return mainly because of differences in costs. Nonetheless, it has been found by many researchers that the differences are quite small, ranging from three to six percentage points, the private rates of return being higher than the social rates of return.[7]

Becker has estimated a lower and an upper limit to the "true" rate of the social returns from education. The lower limit was 13 percent while the upper limit was 25 percent. He argued that although the difference, which he attributed to the ignorance of the external effects, is quite large, the

private economic gain from education accounts for much of the social economic gain.[8]

In spite of the limitations of the above studies, it is undoubtedly true -- as all the studies show -- that the private and social rates of return for investment in education are quite high. Also, what is common in most of these studies is the diminishing nature of the returns from the bottom to the top of the educational ladder. One of the explanations offered for this observation is the fact that elementary and secondary education are more important for the well functioning of the society than higher education. As can be seen, investment in elementary education provides a higher rate of return than does investment in any other educational level. The above observations provide an excellent justification for an increase in the amount of resources that society allocates to education, especially at the elementary level of schooling.

Notes for Chapter 7

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EPILOGUE

At the time this research was commissioned, the Ontario Public School Teachers' Federation had as its main concern a perceived deterioration in the funding of elementary education in Ontario in comparison with secondary education. The purpose of the study was to identify a series of research studies that, if conducted, might come to grips with the issue raised in the study's title, Is Ontario Under-investing in Elementary Education?

There was no premonition at that time that on June 12, 1984, Premier William Davis would announce that the Government of Ontario would extend funding for Grades 11 to 13 in the province's Roman Catholic school system, and that three Commissions would be created including one dealing with school finance in general and one with the financing and governance of private schools. The third is concerned with the implementation of the extension of funding itself.

How are the conclusions and the suggested lines of research in this study affected by the government's decisions?

First, the soundness of the fundamental thrust of the approach taken in this study has been confirmed. We still do not have a clear idea of the economic contribution of education to Ontario specifically. We continue to rely on American data, or partial sets of Canadian data, that only suggest the directions that we should be taking in investing our education dollar. In particular, one can ask, "Should Ontario be investing an additional $140,000,000 per year in secondary education (the estimated cost of extension once it is in full operation), or might those government funds have been better invested in programs at the elementary level?"

Second, given that a thorough review of the method by which Ontario funds education is being undertaken, with suggestions as extreme as moving to full provincial funding, program funding, or the voucher systems, it is striking that we are still without models of how school boards respond to different fiscal and regulative actions by the senior level of government, and that no major study has been conducted that links dollars allocated for education to actual program costs. To say that major decisions are being made in a research vacuum is perhaps too extreme, yet it is clear that the neglect of fundamental

research of the type suggested in the present review of research priorities leaves those who must make critical decisions in a less than enviable position.